**Dissertation on**

# A STUDY OF ROLE OF CONTACT POINTS IN NOSE - AS A CAUSAL FACTOR IN REFRACTORY HEADACHES AND THE OUTCOME OF SURGICAL TREATMENT

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**the requirement for the award of the degree of**
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## CERTIFICATE

This is to certify that this dissertation on "**A STUDY OF ROLE OF CONTACT POINTS IN NOSE - AS A CAUSAL FACTOR IN REFRACTORY HEADACHES AND THE OUTCOME OF SURGICAL TREATEMENT"** presented herein by **Dr.M.SENTHIL KANITHA**, is the original work done in the Department of Otorhinolaryngology, Government of Stanley Medical College and Hospitals, Chennai in partial fulfilment of regulations of the Tamilnadu DR.M.G.R Medical University, Chennai for the award of **M.S (Otorhinolaryngology)** , under guidance and supervision during the academic year 2007 – 2010

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## DECLARATION

I, **DR. M. SENTHIL KANITHA,** solemnly declare that this dissertation, titeled "**A STUDY OF ROLE OF CONTACT POINTS IN NOSE- AS A CAUSAL FACTOR IN REFRACTORY HEADACHES AND THE OUTCOME OF SURGICAL TREATMENT"** is a bonafide record of work done by me in the Department of Otorhinolaryngology, Government Stanley Medical College and Hospitals, Chennai under the **guidance** of **DR. R. MUTHU KUMAR, M.S, DLO, Dip NB,** Prof. & Head Department of Otorhinolaryngology , Government Stanley Medical College and Hospitals, Chennai-1

This dissertation is submitted to The Tamilnadu DR.M.G.R. Medical University, Chennai in partial fulfilment of regulations for the award of **M.S. branch IV(Otorhinolaryngology)** examination to be held in March 2010

**(DR.M. Senthil Kanitha)**

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## CONTENTS

# INTRODUCTION

**Headache** is a very frequent symptom, which is the complaint of half of the subjects that come to the physician. **Chronic headache** is distressing for both the patient and the physician ; to the former due to its nagging nature and to the latter for his inability to diagnose and for problems of self medication in many cases. The **causes** of headache are multi-factorial varying from simple tension headache, migraine, myo-facial spasm , tempero-mandibular joint arthralgia, vascular headache, refractory errors of vision , and brain tumors. It requires a multidisciplinary approach to diagnose the causative factors.

**Contact points** may be a cause of secondary headache or an exacerbating factor for primary headaches[3]. **Mucosal contact headache** is a newly added secondary headache disorder in the International Classification of Headache Disorders (ICHD-2) supported by limited evidence. According to the ICHD-2, these headaches are characterized by intermittent pain localized in the peri-orbital and medial canthal or temporo-zygomatic regions, associated with evidence of mucosal contact points by nasal endoscopy or computed tomography (CT) imaging.

The contact between the structures, in addition to being a mechanical stimulus in those regions considered as origin of the pain, promote local inflammatory process, with release of mediators that are related with the

painful process. The presence of mediators as substance P and histamine reduces pain threshold in the nasal mucosa receptors [1] .The theory of the local reflex triggered by contact between structures, with release of vasoactive amines and onset of edema is a mechanism valued by the literature [3]. This mechanism can be the **substance P** as a mediator of the reflex. P substance is a neuropeptide known since 1931 and found in sensitive nervous fibers of the nasal and paranasal mucosa, among other sites [20,21]

Different stimuli in polymodal receptors located in the nasal mucosa, such as infectious, chemical, caloric or simply mechanical (pressure) irritating agents may generate an orthodromic impulse to the cerebral cortex, mediated by substance P, responsible for the painful stimulus. In addition to orthodromic impulse, such stimuli generate also antidromic impulses, capable of releasing P substance in the nasal mucosa, mediating plasma leak, vasodilation, smooth muscle contraction and hypersecretion. This mechanism is called **axonal reflex.** Mucosa edema may increase the existing pressure among the structures, maintaining the process in a vicious cycle [5]. The occurrence of local trauma by the contact and pressure between the structures can also lead to release of substance P in the nasal mucosa .[14]

Here we assess the headache outcome after the surgical correction of contact points in the sino-nasal area (intra-nasal contact between opposing mucosal surfaces) in patients with chronic headaches.

# AIM OF STUDY

1. To evaluate the outcome of Surgical treatment of patients with refractory headaches with intranasal mucosal contact points.
2. To find out the most common contact point related to headache.
3. To find out the most common region of headache due to intra nasal mucosal contact point.
4. Whether contact point may be an aggravating or triggering factor of Migraine headache.
5. The commonest age group at which mucosal contact headache starts.

## Review of the Anatomy of the Nasal Cavity and Ethmoid Sinuses Relevant To Headaches

The following aspects of the anatomy of nasal cavity are relevant to primary headaches,

The septum divides the nose into two chambers, the right and the left. The septum itself consists of a perpendicular plate of the ethmoid, septal cartilage, and vomer.

1. The roof of the each chamber is composed of the nasal bone, the nasal process of the frontal bone, and the cribriform plate of the ethmoid bone. The cribriform plate of the ethmoid transmits the filament of the olfactory nerve.
2. Projecting from lateral nasal wall are Inferior,middle,superior turbinate and occationally supreme turbinate.Beneath each turbinate bone lies respectively named meatus into which ostia of sinuses drain
3. The innervation of the anterosuperior part of the nasal cavity is provided by the first (ophthalmic) division of the trigeminal nerve, whereas the second (maxillary) division supplies the posteroinferior part.

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**Inferior Turbinate:** is the largest of the three turbinates, under which the inferior meatus lies

**Middle Turbinate**: The middle turbinate bone covers the middle meatus, the most complex region of the lateral nasal wall. Near the superior attachment of the turbinate bone, a prominence of the lateral wall is produced by the agger nasi cells, the most anterior ethmoidal air cells .Above these cells lies the frontal recess. The frontal sinus drains, via the frontal recess, into the anterior aspect of the middle meatus, medial to the uncinate process, or directly into the ethmoidal infundibulum.

The middle turbinate bone attaches to two areas of delicate bone, which can pose potential problems during endoscopic manipulation: the superior attachment to the delicate lateral aspect of the cribriform plate, and the lateral, intra ethmoidal attachment, basal (or ground) lamella, to the thin lamina Papyracea of the lateral ethmoidal wall. Posteriorly, the basal lamella curves superiorly and becomes oriented in the coronal plane, behind the ethmoidal bulla, thereby separating the anterior and posterior ethmoidal air cells. Ethmoidal air cells located anterior to the basal lamella will drain into the middle meatus, whereas those cells located posterior to the basal lamella will drain into the superior meatus [1].

If the middle turbinate bone is medialised, three prominent underlying structures are seen: the uncinate process anteriorly, the hiatus semilunaris, and the bulla ethmoidalis posteriorly.

**The uncinate process**: Is a thin, hook-shaped, mucosa-covered bony prominence, originates anteriorly from the posteromedial border of the nasolacrimal duct. Almost parallel to the middle turbinate bone, it forms a free border that defines the anterior boundary of the hiatus semilunaris. On

Coronal CT, the uncinate process is easily detected as a superior extension of the medial maxillary sinus wall, forming the lateral wall of the middle meatus . Lateral to the uncinate process lies the infundibulum, connecting the

ostia of the maxillary and ethmoidal sinuses to the hiatus semilunaris . Mucociliary drainage from the maxillary sinuses courses superiorly, through the ostia and posterior infundibulum to the hiatus semilunaris, and eventually into the middle meatus.

**The hiatus semilunaris**: is bounded superiorly by the bulla ethmoidalis, laterally by the bony orbit, inferiorly by the uncinate process, and medially by the middle meatus. It accommodates multiple anterior ethmoidal ostia, and the single maxillary sinus ostium, to form the final segment of drainage from these sinuses. A superior extension of the hiatus semilunaris communicates with the sinus lateralis, the space between the posterior wall of the ethmoidal bulla and

the basal lamella, providing drainage of this area and the middle ethmoidal air cells.

**The bulla ethmoidalis** : usually consisting of a single ,the largest anterior ethmoid air cell, projects inferomedially over the hiatus semilunaris in a rounded fashion. This is one of the most constant features in the middle meatus, forms the posterior margin of hiatus semilunaris and ethmoid infundibulum., linking the frontal, anterior , middle ethmoidal, and maxillary sinuses to the middle meatus. This connecting channel is collectively

referred to as the ostiomeatal unit (OMU)

In summary, Mucociliary drainage of the sinuses eventually merges into two common pathways, allowing division into two anatomic and functional groups [2]. The first group (frontal, anterior ethmoidal, middle ethmoidal, and maxillary sinuses) drains into the middle meatus, around the ethmoidal bulla (the OMU) . The second group (posterior ethmoidal and sphenoidal sinuses), draining into superior meatus and the spheno ethmoidal recess.

**The nasal septum**: easily identified on both axial and coronal CT, extends the entire length of the nasal cavity. The anterior portion is composed of cartilage, whereas the posterior portion is osseous, formed mainly by the vomer and the perpendicular plate of the ethmoid bone. The inter frontal septum anteriorly and the inter sphenoidal septum posteriorly do not always lie in the same plane as the nasal septum. This is an important anatomic consideration for endoscopic surgeons.

## Anatomical Variations

The most common variations are

1) **Middle Turbinate variations**
2) **Uncinate variations**
3) **Ethmoid Bulla variations**
4) **Nasal septal variations**

## Middle turbinate Variation:

### Concha bullosa:

Pneumatisation of middle turbinate is known as concha bullosa. A concha bullosa usually occurs bilaterally, but pneumatisation may be variable.(13)The degree of pneumatisation may be so severe that both middle turbinates, expanded like balloons, come into intimate and extensive contact with lateral wall of the nose and large areas of nasal septum.(13) However, that the concha bullosa and septum deviation are only the co-incidental appearance two anatomic variants, since in many cases of marked septal deviation, the pneumatisation of the middle turbinate is bilateral.(13) Pneumatisation of middle turbinate may originate from the frontal recess (most frequent sight of origin), agger nasi or from the lateral sinus, may also come directly from middle meatus. Usually a Concha bullosa contains only a single air cell occasionally two and very rarely three air cells .The reported prevalence of concha bullosa ranges

from 4% to 80%.Stammberger reported that when the concha is sufficiently large, produce signs and symptoms by encroaching on infundibulum. The presence of a concha bullosa alone is not necessarily a pathologic finding. However, if combined with other anatomic abnormalities, such as a medially bent uncinate process or an enlarged ethmoidal bulla, even a small concha bullosa may produce a significant narrowing of middle meatus. Large contact surfaces predispose to marked nasal obstruction, disturbance to transportation of secretions producing unpleasant postnasal drip. The concha bullosa have significant role in the formation nasal polyps in contact areas.Endoscopically, a concha bullosa usually presents as an enlarged head or body of middle turbinate that is in contact medially with the nasal septum and bulges laterally into the lateral nasal wall [13]

**Paradoxically turned middle turbinate:**

Normally, the convexity of the middle turbinate bone is directed medially, toward the nasal septum. When paradoxically curved, the convexity is directed laterally, toward the lateral sinus wall. This anatomic variation usually occurs bilaterally [13]. 26.1 % prevalence of paradoxically curved middle turbinates has been reported [9]. Although no studies relate this variation to sinus disease, when the paradoxically bent turbinate is usually combined with other anatomic variation that together produce a significant and extensive mucosal contact areas [13]

## Uncinate Variations

**Deviation of the uncinate tip.-**The superior aspect of the uncinate tip may deviate laterally, medially, or anteriorly out of the meatus, appearing as a second middle turbinate bone [13]. When deviated medially, it comes into contact with and compromises the middle meatus.

**Pneumatised uncinate tip (uncinate bulla).-** The exact mechanism by which uncinate pneumatisation occurs is not known. It has been proposed that this process is due to growth of agger nasi cells into the most anterosuperior region of the uncinate process [9]. Studies reveal a prevalence of 0.4-2.5% [9]. This variation has been implicated in narrowing of the infundibulum, producing impaired sinus ventilation [16].

## Ethmoidal Variations

**Haller cells**-According to Kennedy and Zinreich [17], Haller cells, ethmoidal air cells that project inferiorly to the ethmoidal bulla into the floor of the orbit in the region of the maxillary sinus ostium, are encountered in 10% of the population. However, Bolger et al. [9] defined Haller cells as any air cells located beneath the ethmoidal bulla, lamina papyracea, or orbital floor. Using this criteria, they reported a prevalence of 45%. Although they found no significant difference in the prevalence of Haller cells between patients scanned for chronic sinus disease and patients scanned for non sinus disease.

Stammberger and Wolf [13] consider the presence of these cells as another predisposing factor for recurrent maxillary sinusitis.

**Large ethmoidal bulla.-**The ethmoidal bulla can be so extensively pneumatised that it completely fills the sinus of the middle turbinate bone . Stammberger and Wolf [13] reported that an enlarged ethmoidal bulla may contribute to sinus disease by obstructing the infundibulum or middle meatus or by being primarily diseased and filled with pus,cysts, or polyps. The exact prevalence of an enlarged ethmoidal bulla is not known.

**Agger nasi cells**.-Agger nasi cells, the most constant ethmoidal air cells, lie below the frontal sinus, inferolateral to the lacrimal sinus, and represent pneumatisation of the lacrimal bone by extension of the anterior ethmoidal cells [10].They are located anterior and superior to the insertion of the middle turbinate bone, along the lateral nasal wall [1 3] . In anatomic dissection, the prevalence of the agger nasi cell varies from 10% [18] to 89% [1 9]. Because of their location near the lacrimal sac, involvement of these cells by sinus disease can lead to ocular symptoms. These cells may provide access to the frontal sinus and recess during endoscopy.

## Nasal Septum Variations

**Nasal septal deviation**.-Normally, the structures that make up the nasal septum are aligned to form a straight wall, extending from the cribriform plate superiorly to the hard palate inferiorly. At the junction of the nasal cartilage and vomer, acute bowing and deviation of the septum occur in 20% of the population [20]. When severe, the deviated septum may compress the middle turbinate bone laterally, narrowing the middle meatus and causing obstruction, secondary inflammation, and infection. When it is associated with swollen membranes, there is additional obstruction to the normal flow of mucus from the sinuses.

# CLASSIFICATION OF HEADACHE

# INTERNATIONAL HEADACHE SOCIETY-II

**PART ONE: THE PRIMARY HEADACHES**

1. MIGRAINE
2. TENSION-TYPE HEADACHE (TTH)
3. CLUSTER HEADACHE AND OTHER TRIGEMINAL AUTONOMIC CEPHALALGIAS
4. OTHER PRIMARY HEADACHES

**PART TWO: THE SECONDARY HEADACHES**

5. HEADACHE ATTRIBUTED TO HEAD AND/OR NECK TRAUMA
6. HEADACHE ATTRIBUTED TO CRANIAL OR CERVICAL VASCULAR DISORDER
7. HEADACHE ATTRIBUTED TO NON-VASCULAR INTRACRANIAL
8. HEADACHE ATTRIBUTED TO A SUBSTANCE OR ITS WITHDRAWAL DISORDER
9. HEADACHE ATTRIBUTED TO INFECTION
10. HEADACHE ATTRIBUTED TO DISORDER OF HOMOEOSTASIS

**11.** HEADACHE OR FACIAL PAIN ATTRIBUTED TO DISORDER OF CRANIUM, NECK, EYES, EARS, **NOSE, SINUSES**, TEETH, MOUTH OR OTHER FACIAL OR CRANIAL STRUCTURES

*11.5.HEADACHE ATTRIBUTED TO RHINOSINUSITIS*

*11.5.1 MUCOSAL CONTACT POINT HEADACHE*

*11.9 . CHRONIC POST CRANIOCERVICAL DISORDER HEADACHE.*

## Diagnostic criteria:

**Intermittent pain localised to the peri-orbital and medial canthal or temporo-zygomatic regions and fulfilling criteria C and D**

**A.** Clinical, nasal endoscopic and/or CT imaging **evidence of mucosal contact points without acute rhino-sinusitis**

B. Evidence that the pain can be attributed to **mucosal contact** based on at least one of the following:

1. pain corresponds to gravitational variations in mucosal congestion as the patient moves between upright and recumbent postures
2. abolition of pain within 5 minutes after diagnostic topical application of local anaesthesia to the middle turbinate using placebo- or other controls[1]

C. Pain resolves within 7 days, and does not recur, after surgical removal of mucosal contact points

**Note:**

Abolition of pain means complete relief of pain, indicated by a score of zero on a visual analogue scale (VAS).

12. HEADACHE ATTRIBUTED TO PSYCHIATRIC DISORDER

**PART THREE: CRANIAL NEURALGIAS, CENTRAL AND PRIMARY FACIAL PAIN AND OTHER HEADACHES**

13. CRANIAL NEURALGIAS AND CENTRAL CAUSES OF FACIAL PAIN

14. OTHER HEADACHE, CRANIAL NEURALGIA, CENTRAL OR PRIMARY FACIAL PAIN

## PATHO-PHYSIOLOGY OF PAIN MEDIATION

The causal relation between nasal anatomical variations and headache became the object of investigation of this study give special attention to the role of sensory innervation of the nasal cavity, because its stimulation, specially mechanical, would be considered the triggering of the referred pain [6,4,8-10].

**Ophthalmic and maxillary branches of the trigeminal nerve** are responsible for nasal mucosa sensitivity. The ophthalmic branch is divided into the following nerves: lachrimal, frontal and nasociliary, and in turn it originates anterior and posterior ethmoid and infratroclear nerve. Behind these branches, the **ophthalmic nerve** is responsible for the sensitivity of the ocular globe, palpebra, forehead, root and lateral portion of the nasal pyramid, ethmoid cells and nasal mucosa of the middle and superior turbinate , and corresponding region to the nasal septum [7].

The **anterior ethmoid nerve** is the pathway responsible for the sensitivity in the nasal region considered to trigger the pain, and its pathway is described as follows: it leaves the orbit through the foramen and anterior ethmoid canal to enter into the anterior cranial fossa; after passing through the dura and bone, it reaches the nasal cavity through the fissure close to crista galli. The nerve goes down through the sulcus on the internal aspect of the nasal bone and then is

exteriorized by going through the nasal bone and superior lateral cartilage as external nasal nerve. In the nasal cavity, there are medial branches to the septum and lateral branches to the anterior portions of the middle and superior concha and to the lateral wall anterior to them [6]. The anatomical characteristics of the anterior ethmoid nerve, that is, its superficial pathway concerning the nasal mucosa and the narrow bone canals that it crosses, makes it susceptible to pathological processes [7].

The **maxillary branch, through pterygo-palatine nerves**, sends posterior and superior nasal branches, responsible for the sensitivity of middle and superior concha and superior meatus. Posterior-inferior nasal branches, coming from the major palatine nerve, also a branch of the maxillary nerve, are responsible for the floor of the nasal cavity, inferior and middle meatus, in addition to inferior concha.

The superior region of the septum has the sensitivity determined by the nasopalatine nerve, another branch of the major palatine nerve, which heads to the incisor foramen. Moreover, the maxillary nerve fibers, when exteriorized at the infra-orbital foramen through the infra-orbital nerve, send nasal branches to the skin of the lateral region of the pyramid, including the nasal ala. Finally, the higher area of the mucosa of the nasal cavity is innervated by maxillary nerve branches, except for the anterior portions of middle and superior concha and the

region anterior to them, as well as the area corresponding to the nasal septum, which are innervated by the ophthalmic branches.

***Pathophysiology of pain***

The sensitivity of the nasal mucosa was investigated through stimulation with faradic current in many different areas of the nasal cavity of volunteers that had to describe what they felt. It was observed that concha and ostia are much more sensitive to stimulation than paranasal sinuses recovering mucosa [12].

Thus, it was determined that the headache of sinusopathy has nasal origin, and not from the infected paranasal sinuses, as we could have expected. The same authors were supported by the observation that they had more intense pain caused in their experiments, in the presence of congestion and hyperemia of the concha, compared to the moment they were free from such affections, regardless of the paranasal sinuses status.

They were also supported by the suspension of pain in patients with sinusitis by retracting or anesthetizing the concha and nasal structures. It was also observed that the referred pain affected areas of the maxillary branch and fewer areas of the ophthalmic branch. The study was used as a reference in subsequent studies [7].

Other authors that caused chemical and tactile stimuli (pressure) in different regions of the nasal cavity, detected the onset of referred pain both in the

regions innervated by the ophthalmic branch and by the maxillary branch of trigeminal nerve [3]. They also defined the innervation of the anterior portion of the middle concha and the corresponding region of the septum by the anterior ethmoid nerve and upon stimulating these areas, they detected pain in the distribution of infra and supra-troclear nerves, skin divisions of the ophthalmic branch, corresponding to inner canthus and supraorbital region. Some observations consider that the triggering stimulus of symptoms occurs in the area named retro-tubercular, located behind the septal thickness at the level of the chrondro-cutaneous joint, which is distributed from the ophthalmic branch [7]. However, other authors consider that this region has innervation by the sphenopalatine ganglion [6], that is, maxillary nerve.

The importance of the sensorial innervation of the nasal mucosa in triggering the painful symptom was reinforced by the relief of pain after application of topical anaesthesia, cocaine, in the nasal cavity, specifically between the middle concha and the septum, whose sensitivity is conducted by the anterior ethmoid nerve [3,8,10,13]. Vasoconstrictors [9] and lidocaine [13], that cause immediate relief, characterize the positive response to the test.

These data support the idea that we can define areas of the nasal mucosa that trigger pain such as the anterior portion of the middle turbinate and the corresponding region of the nasal septum [3-4,6].

The pain referred by patients is placed specifically in the areas supplied by the skin branch of the ophthalmic nerve, especially supra and infra-troclear nerves, that is, internal canthi, supra-orbital region and temporal-zygomatic region [3, 9]. There are authors that also include the neck and upper limbs [6].

The mechanism of referred pain was quoted in 1946 [7], stating that the association of nasal and intraorbital sensitive fibers and their nuclei at the central level explained the similarity of the symptoms of the pathological involvement of both areas, showing that the orbital pain may be produced in intra-nasal regions. **Afferent fibers of pain receptors located in the nasal and paranasal mucosa determine the same pool of sensorial neurons in the nucleus of the trigeminal nerve than fibers coming from skin receptors. These two pathways end up in the same neurons of the common cortical area. "The cortical center can not differentiate the original peripheral source of impulses in this common pathway, thus, when the mucosa is stimulated, pain afferent impulses are falsely located after they reach the sensorial cortex.**

They are poorly interpreted and based in previous experienced such as coming from the skin, region from where the impulses normally reach this point in the brain" [5]. Another mechanism of referred pain considers that the presence of neurogenic edema in distant regions of the stimulated site: trigeminal fibers that contain **substance P**, upon stimulation, can trigger **antidromic impulses**

responsible for the release of substance P in other areas innervated by the trigeminal branches, which leads to an inflammatory process in these sites, explaining the onset of pain in the distant region of the stimulated area 14.

It was considered that the stimulus of the reported nasal mucosa region was caused by the contact between the subsequent nasal structures of anatomical variations of constitutional or traumatic origin [4,8,15], middle concha hypertrophy or pneumatisation [3,11,14,16].

Middle concha pneumatisation may occur because they are part of the ethmoid complex that expands according to potential spaces [17].

A long list of anatomical variations that predispose to headache, affecting the nasal septum, agger nasi cells, middle turbinate, ethmoid bulla and combination of them all, is considered in this Pathophysiology [5], including the affections to superior concha, asymmetry of ethmoid complex and skull base affections [10].

Other authors have carried out a review of a series of coronal sections of computed tomography (CT) of paranasal sinuses, analyzing bone affections, including middle concha pneumatisation, agger nasi cells and Haller cells, and did not find clear correlation between these affections and the pathology [18].

Many authors consider the existence of pressure between these structures as the main stimulus [3-4,6,9-11], but even without permanent contact between the structures, it is defined according to the nasal cycle, and is influenced by

physical, climatic stimuli, such as moisture and temperature, in addition to chemical, allergic and inflammatory stimuli [10,11].

The contact between the structures, in addition to being a mechanical stimulus in those regions considered as origin of the pain, promote local inflammatory process owing to Mucociliary dysfunction, which takes to release of mediators that are related with the painful process. Moreover, the approximation of mucous surfaces leads to dryness of the mucosa because of Bernoulli's effect (increase in speed of flow and reduction in pressure, according to reduction of the section area) in airflow, with accumulation of mucus and limitation of ciliary function [11]. Local inflammatory process helps to aggravate the pressure that exists between the structures by causing edema. Such affections create the conditions for the development of local infectious process, an important factor for onset of pain. The presence of mediators as P substance and histamine reduces pain threshold in the nasal mucosa receptors [19].

**The theory of the local reflex triggered by contact between structures,** with release of vasoactive amines and onset of edema is a mechanism valued by the literature [3]. This mechanism can be the **substance P as a mediator of the reflex**. P substance is a neuropeptide known since 1931 and found in sensitive nervous fibers of the nasal and paranasal mucosa, among other sites [20,21]. Different stimuli in polymodal receptors located in the nasal mucosa, such as infectious, chemical, caloric or simply mechanical (pressure) irritating agents

may generate an orthodromic impulse to the cerebral cortex, mediated by substance P, responsible for the painful stimulus. In addition to **orthodromic impulse**, such stimuli generate also **antidromic impulses**, that is, contrary to what we could expect from afferent fibers, capable of releasing **substance P** in the nasal mucosa, mediating plasma leak, vasodilation, smooth muscle contraction and hypersecretion. This mechanism is called **axonal reflex**. Mucosa edema may increase the existing pressure among the structures, maintaining the process in a vicious cycle [5]. The occurrence of local trauma by the contact and pressure between the structures can also lead to release of substance P in the nasal mucosa [14].

Another mechanism related with the reported anatomical variations is the obstruction of drainage ostia of the paranasal sinuses, resulting in poor aeration, leading to vacuum headache or hypoxia [5,10,15,22].

In addition to these mechanisms, headache is reported as a secondary symptom to nasal obstruction owing to septum deviation in rates that range from 23%[23] to 58%[15], and its surgical correction would lead not only to improvement of nasal obstruction, but also headache [24]. Alternatively, it is also observed that failure in surgical treatment to control pain may be related to persistence, at least partial, of nasal obstruction [25].

Authors in a Brazilian study have observed nasal obstruction in 82% of the 11 cases of medium turbinate headache syndrome [26].

There is the consideration that anatomical variations causing narrowing of nasal cavities would represent the triggering factor or the first stage of different forms of headaches [10]. Such affections cause edema of nasal mucosa when submitted to climatic or hormonal affections and consequently to pressure between the structures and hypoventilation of paranasal sinuses, leading to tissue hypoxia and serotonin release and other vasoactive substances, finally inducing to crisis. The same authors demonstrated the value of nasal surgical treatment to relieve such cases.

The population affected with nasal obstruction by septum deviation and headache from different clinical modalities was studied and submitted to surgical treatment Among the different patho physiological mechanisms of headache, the role of traumatic nasal deformities is valued by some authors that consider that they are aggravated by climatic changes [27].

The explanation would result from connections between trigeminal nervous fibers, responsible for innervation of paranasal sinuses with parasympathetic neurons of sphenopalatine ganglion [28].

The fact that trigeminal fibers are widely distributed around important vessels of the central nervous system, comprising a trigeminal-vascular system, reveals

the patho physiological role of these fibers. When stimulated, they would lead to an inflammatory process of these vessels, mediated by substance P and gene-related to calcitonin, which is experimentally observed in dura of animals by plasma leak, activation and degranulation of mast cells and increase in vesicles of endothelial cells, which could trigger headache crises [29].

**1) MrJamesWFairl et al** (1992),

Discussed about the abnormalities in the nose, particularly involving contact between opposing mucosal surfaces of the middle turbinate and its relations, can be associated with pains in the face, eye and head, even in the absence of sinus infection, even tension headaches and migraines are caused by nasal mucosal congestion and can be treated surgically.

**2) Fred J. Lame1 and Wendy R. K. Smoker et al ,1992**

In this article,they reviewed the anatomy of the lateral nasal wall,anatomical variants and paranasal sinuses, discussed the most frequently encountered normal variations that may predispose a patient to inflammatory sinus disease and headache outline imaging protocols for evaluation of this region, and introduce the reader to current endoscopic surgical techniques. Last, the imaging findings in various inflammatory processes involving the sinuses, as well as the local and regional complications associated with paranasal sinus inflammatory diseases, are presented.

**3) Dean Michael Clerico , M.D. Robert Fieldman , M.D. et al 1993**

They reported a case of a patient with chronic and severe headache for whom neurological and neurosurgical evaluation failed to reveal an aetiology, but who possessed an intranasal anatomical variant

(without sinusitis). Her headache resolved after endoscopic nasal surgery. They discussed the mechanisms of such referred pain, and the recent technological advances that made the diagnosis and treatment of this disorder possible.

**4) Clerico DM et al 1994, Department of Otorhinolaryngology-Head and Neck Surgery, Hospital of the University of Pennsylvania, Philadelphia**

Nasal signs and symptoms commonly accompanied cephalgia in some headache syndromes. Head pain associated with sinusitis was also fairly well-recognized. However, referred cephalgia of rhinogenic origin, in the absence of sinonasal symptoms or disease, was poorly understood. They reported a case of a patient with chronic and severe headache for whom neurological and neurosurgical evaluation failed to reveal an aetiology, but who possessed an intranasal anatomical variant (without sinusitis). Her headache resolved after endoscopic nasal surgery. They discussed the mechanisms of such referred pain, and the recent technological advances that made the diagnosis and treatment of this disorder possible.

**5) Fusco BM, Fiore G, Gallo F, Martelletti P, Giacovazzo M.et al in 1994**

Institute of Internal Medicine VI, University La Sapienza, Rome, Italy ,conducted a study on Capsaicin, when repeatedly applied to the nasal mucosa of cluster headache patients, has been shown to prevent the occurrence

of pain attacks. In order to investigate the mechanism of the drug's action, evaluated the effect of repeated nasal application of capsaicin on the contents of sensory fibres immunoreactive to substance P and CGRP . Further, considering the possible involvement of the cerebral circulation, verified the effect of a single application of capsaicin on the blood flow velocity of the internal carotid and middle cerebral arteries (of both sides) and the basilar artery, in a group of healthy humans. The measurements were taken using Doppler devices. In order to verify the reproducibility of therapeutic effect of capsaicin, they carried out a 2-year follow-up study on patients affected by cluster headache (17 by episodic form, 8 by chronic form) who responded positively to the first treatment with capsaicin. During this period they were treated again with capsaicin in case of re-occurrence of symptoms.

**6) Dr. V. Josef Novak, MD [1 *], Dr. Miro Makek, MD at al ,1994**

Department of Otorhinolaryngology, Kantonsspital, Lucerne, Switzerland Department of Pathology, University of Zürich, Zürich, Switzerland

Patients (299) with various types of headaches (migraines, cluster headaches, and so-called idiopathic headaches) were operated on between 1973 and 1991. Septal correction, resection of the middle concha, ethmoidectomy, and sphenoidectomy on the corresponding

headache side or occasionally on both sides were carried out. Most patients (235; 78.5%) were totally asymptomatic postoperatively; 34 (11.5%) had a sensation of pressure in the head on rare occasions but no further migraines, and 30 (11%) continued to experience headaches that occurred only rarely and were mild and of short duration.

**7) V .J. Novak, MD.et al 1995**

Patients ( n = 446) with various types of headaches ( migraine, cluster headache and so-called idiopathic or primary headaches) were operated upon between 1973 and 1994. Septal correction, resection of the middle and superior concha, ethmoidectomy, and sphenoidectomy on the corresponding headache side or occasionally on both sides were carried out. Most patients (356, 80%) were asymptomatic postoperatively, 45 ( 10%) had a sensation of pressure in the head on rare occasions but no further migraine, and 45 ( 10%) continued to experience headache that occurred only rarely and was mild and of short duration. The overall success rate was 90%.
For cluster headache in 20 patients, we observed the following postoperative results: 19 cured (98%), 1 improved (2%)

**8) Low WK, Willatt DJ.et al 1995**

They have revealed a deviated nasal septum not only can cause a blocked nose, but may also be associated with headaches. This study evaluates the nature of these headaches, the effect of submucous resection of the nasal septum, and the factors associated with postoperative headache relief. Deviated nasal septa were corrected by submucous resection in 99 men and 17 women. Patients were studied at 4 to 48 months (mean 18 months) postoperatively. Fifty-five of the 116 patients studied (47.4%) had preoperative recurring headaches. Thirty-five of the 55 patients with headaches (63.6%) experienced relief (complete or partial) of their headaches at a mean follow-up period of 18 months. Patients were more likely to be relieved of their headaches following submucous resection if the headaches were most intense over the frontal region, pressurelike in nature, and if the submucous resection resulted in relief of nasal obstruction. It is possible that headaches recur in the long term, and it is postulated that central mechanisms play a role.

**9) M. Abu-Bakra [a1] and N. S. Jones [a1]2001 Department of Otorhinolaryngology, University Hospital, Nottingham, UK**

conducted a cohort of 973 consecutive attendants at a rhinology clinic was studied prospectively and divided into patients without facial pain (n = 566, 58 per cent) and patients with facial pain (n = 407, 42 per cent). The prevalence

of nasal mucosal contact points was the same in both groups, being four per cent in patients with nasal contact points without facial pain and four per cent in patients with facial pain. The results demonstrated that the prevalence of nasal contact points in patients with facial pain is the same as in those without pain. Surgery undertaken to remove mucosal contact points for facial pain was usually unnecessary as the aetiology of this facial pain appears to be a more central processes.

**10) Abed Rabu Qubilat FRCS*, Nemer Al-Khtoum MD et al,2002**

Results: Twenty-five patients (43%) had headaches preoperatively occurring at least once a month for 1 to 10 years (mean 4.5 years). The site where the headache was most intense was most frequently found over the frontal region (58.9%). It was described mainly as pressure-like (47.4%) or dull (35.2%); occurring frequently in the mornings (37.6%). After surgery, eighteen of the 25 patients with headaches (72%) experienced relief of their headaches at a mean follow-up period of 13 months

**11) Giacomini PG, Alessandrini M, DePadova A. Et al 2003**

They have reported a data of long-term follow-up study of facial pain in a group of 34 patients with facial pain and nasal obstruction due to septoturbinal contact that did not respond to medical therapy. Patients, free from sinus disease or other causes of headache, were treated by septoplasty/rhinoseptoplasty,and

middle turbinate electrocauterization. Pre- and postoperative patency was assessed by endoscopic evaluation and nasal resistance was assessed by anterior rhinomanometry. Patients were interviewed regarding pre- and post-operative intensity of pain (subjective pain was evaluated using the 0-10 Visual Analogue Scale (VAS) and frequency of the facial pain. The follow-up period ranged from 12 to 47 months (mean: 26.7 +/- 8.5 months). In 25% of the cases the pain relapsed post-operatively (from two days to one year); but in only three patients (8%) the relapses were persistent. Two out of three, however, reported a decreased VAS score after surgery. These results seem to indicate septoplasty and turbinate decongestion to be a fairly good surgical option in treating facial pain due to septoturbinal contact resistant to conservative nasal therapy.

**12) Jeferson Cedaro de Mendonça[I]; Ivo Bussoloti Filho et al 2005**[,]

The causal relation between anatomical variations of the nose and headaches and facial pain was analyzed through literature review of the topic. The pathogenesis of simple alteration of nasal septum and turbinates that can cause mechanical stimulus through contact between these structures, which covers infectious factors, neurogenic inflammation, correlation with migraines and the role of nasal obstruction. The clinical findings of a lot of authors including the test with topical anesthetic to prove this causal relation, the indication of surgical treatment, in addition to good results of this treatment, were reported.

The mechanism of pain relief obtained through surgical correction of nasal septum and turbinate was discussed.

**13) Behin F, Behin B, Bigal ME & Lipton RB et al, 2005**Mount Sinai Medical Center, New York, NY,

assessed the benefits of surgical correction in patients with refractory migraine or transformed migraine, and radiographic evidence of contact points in the sinonasal area.They reviewed charts of patients who underwent endoscopic sinus surgery and septoplasty for contact point in the same surgical facility, from October 1998 through August 2003.

Subjects eligible for surgery had: (i) refractory migraine (failed to standard pharmacological headache treatments) or refractory transformed migraine; (ii) contact points demonstrated by computed tomography scan; (iii) reported significant headache improvement after topical anaesthesia to the contact area. Headache characteristics were assessed preoperatively and at follow-up (6–62 months after surgery) using a standardized questionnaire. A total of 21 subjects (72.5% women) were assessed. Mean headache frequency was reduced from 17.7 to 7.7 headache days per month ($P$=0.003). Mean headache severity was reduced from 7.8 to 3.6on a 0–10 scale ($P$=0.0001). Headache-related disability was reduced from 5.6 (10-point scale) to 1.8 ($P$<0.0001). A total of 16 subjects (76.2%) had their headache scores improved by 50% or more; nine (42.9%)

were pain free at the last followup.A total of 18 (95.8%) had at least a 25% reduction in their headache scores.

**14) Fereidoon Behin, MD, Richard B. Lipton, MD, and Marcelo Bigal, MD, PhD et al 2006**

Suggested that contact point can trigger headache in individuals with migraine. In this article, they reviewed the anatomy of the sinonasal cavity.They then defined contact points and discussed the pathophysiology of contact point headaches. They proposed a theory to explain the relationship between migraines and contact points. In migraineurs with contact point, surgery may improve the headaches.

**15) Col SB Mahajan*, Air Cmde LK Kochhar VSM, Dr AK Gupta et al 2006**

This paper presented an evaluation and results of a study conducted on 62 patients out of 140 cases of chronic headache seen in ENT OPD.

32 patients were taken up for minimal endoscopic surgery. 23 cases (72%) have shown significant relief from headache over a period of 6 months or more. 11 cases showed anatomical / pathological variations at the ethmoidalis infundibulum, the commonest cause being enlarged bulla ethmoidalis followed by minimal polyps/polypoidal mucosa at the frontal recess area.

Other causes are hyperplastic sinusitis, high posterior septal deviation, large middle turbinate, paradoxical middle turbinate and concha bullosa.

To conclude ,Minimal conservative resection of anatomical abnormalities which per se may not be disease entities or small pathological lesions in intricate lateral wall of nose may only be required to alleviate chronic intractable headache

**16) Abed Rabu Qubilat FRCS*, Nemer Al-Khtoum MD*et al 2007**

They investigated the nature of chronic headaches and the outcome following septal surgery. patients had submucous resection (SMR) of the deviated nasal septum and were followed up in the clinic for 6-24 months postoperatively (mean 13 months).

Results: Twenty-five patients (43%) had headaches preoperatively occurring at least once a month for 1 to 10 years (mean 4.5 years).

The site where the headache was most intense was most frequently found over the frontal region (58.9%). It was described mainly as pressure-like (47.4%) or dull (35.2%); occurring frequently in the mornings (37.6%).

After surgery, eighteen of the 25 patients with headaches (72%) experienced relief of their headaches at a mean follow-up period of 13 months.

**Conclusion:** Nasal septum deformity is presented as an easily diagnosed and readily correctable cause of chronic headache within the confines of proper diagnostic evaluation and thorough elimination of other more serious causes of facial pain and headache.

**17) Mohebbi A, Memari F, Mohebbi S.et al 2009**

They have conducted a study to evaluate the feasibility and effectiveness of endoscopic surgery in the sinonasal region for treatment of headache with the contact points between the lateral nasal wall and the septum could be the cause of triggering and sustained pain via trigeminovascular system. Average follow-up was 30 months. Results.- Our overall success rate approximated 83% while the complete cure rate was 11%. Patients in group 4 achieved the best results. In this group all diagnostic criteria were positive. In addition, patient responses were statistically significant in groups with more than one positive criteria compared with group 1 who only had positive examination. The positive response of 14 migrainous patients diagnosed with migraine prior to treatment was 64%. Conclusion.- Surgery in specific cases of headaches with more positive evidence of contact point could be successful, particularly if medical therapy has failed.

## Inclusion criteria

PATIENTS eligible for inclusion in this study – includes:

(i)Refractory headaches (failed to standard pharmacological headache treatments) or refractory transformed migraine headaches having Intermittent pain localized to the periorbital and medial canthal and frontal or temporozygomatic regions from 6 months to 5yrs duration.

(ii) Diagnostic nasal endoscopic and/or CT imaging evidence of mucosal contact points without acute rhino-sinusitis. **Contact points** had to be present on CT scan. This was defined by **contact** between the nasal septum and superior or middle turbinate and/or medial wall of ethmoidsinus .

(iii) During a headache attack, patients reported significant improvement after topical anaesthesia to the contact area. The area of the contact point was treated with cottonoid soaked in decongestant and 4%lignocaine. If the headache completely disappeared or diminished by more than 50% in intensity, subjects were considered candidates for surgery.

(iv) Both male & female.

(v) Age group from 18 years to 50 years.

(vi) Patients submitted to endoscopic sinus surgery and septoplasty for contact point headache.

(vii) Evidence of any sinus disease that could explain the headache symptoms was an **exclusion criterion**.

A total of 50 cases in ENT outpatient in the year Sep2007- June 09 -with chronic refractory headache those meets the inclusion criteria – were included in the study.

Other Patients were found to have some systemic cause for headache, cluster headache, with refractory error, tempero-mandibular pain, were thus **excluded** from this study. Patients with obvious s frank sinogenic symptom attributable to headache have also not been included in the study.

These 50 patients of chronic headache were then subjected to detailed ENT examination. The youngest patient was 18 years and oldest 41 years.

All the patients were suffering from headache varying from 6 months to 5 years time. Headache was present in temporal, frontal, frontotemporal, neck and malar region in isolation or in combination of more than one location. It was intermittent with exacerbations, recurrent episodic or continuous dull ache.

All the patients were subjected to detailed history taking, clinical and systemic examination prior to otorhinological examination to rule out any systemic causes like hypertension, migraine, tension headache,neurological causes, ophthalmological examination to rule out refractory errors, gynaecological check up to eliminate premenstrual tension and premenopausal syndrome as cause of headache.

**ENT examination** consisted of detailed history of headache, its periodicity, intensity, localization, precipitating factors, associated symptoms like nausea, vomiting, nasal block, rhinorrhoea, anosmia, epistaxis, and snoring. Anterior and posterior rhinoscopy was done to assess and evaluate any anatomical variation or pathological lesion. X-ray paranasal sinuses water'sview and additional views if required were done to rule out any paranasal pathology.

Routinely this was followed by **diagnostic endoscopy** under local anaesthesia. **CT scan** was ordered in patients who were found to have some evidence of pathology or anatomical variation .**Contact points had to be present on CT scan**. This was **defined by contact between the nasal septum and superior or middle turbinate and/or medial wall of ethmoid sinus**. (Fig. 1 displays the normal regional anatomy, while Fig. 2 shows contact points). **During a headache attack, patients reported significant improvement after topical anaesthesia to the contact area.**

The **area of the contact point** was treated with cottonoid soaked in decongestant and lignocain. If the headache completely disappeared or diminished by more than 50% in intensity, subjects were considered candidates for surgery. After a complete work up, these Patients submitted to endoscopic sinus surgery and septoplasty for contact point headaches in the same surgical facility, from 2007 through 2009.

## SURGICAL TECHNIQUE

Once the diagnosis was made and consent was obtained, surgery was scheduled. This procedure required general anaesthesia. The area between the septum and middle turbinate and/or ethmoid sinuses were visualized and the contact point was identified.

The surgery (FESS) included **septoplasty, middle turbinectomy, uncinectomy and ethmoidectomy**. Septoplasty was always performed first, followed by a middle turbinectomy in order to gain access to the medial wall of ethmoid cells. Next, the ethmoidectomy was performed, and the medial wall of ethmoid sinuses were removed. Patients who had contact between the septum and middle turbinate had a partial middle turbinectomy and septoplasty performed..

## FOLLOW UP

**Headache information** was obtained using standardized questionnaires at baseline and at follow-up visit( **2–6 months after surgery**).

**At baseline** we collected information on headache frequency, severity (10- point ordinal scale, where 0 was no pain and 10 was pain as bad as it can be), **At follow-up** we repeated the same questionnaire.

The patients presenting were in the **Age range** of 18 yrs to 41 yrs,

The **mean age of presentation was 26.7 years.**

26 were **females (52%)** and 24 were **males(48%).**

It was found that

14 patients suffered from **deviated nasal septum** with spur (26%).

Isolated deviated nasal septum- 6,

Deviated nasal septum with middle turbinate variation- 5,

With inferior turbinate hypertrophy– 3.

21 patients had **concha bullosa**-44%

Unilateral – 10, bilateral -7.

Concha associated with lateral nasal wall variation – 3.

Associated with septal variation- 4 .

10 patients had **over pneumatised bulla** (26%)

Unilateral- 4, bilateral- 6

5 Patients had **paradoxical middle turbinate (**10%).

(unilateral -0, bilateral-5)

2 patients had **prominent agger nasi** -4 %

(unilateral-1 , bilateral-1) .

13 patients had associated **nasal blockage (26%)**

(unilateral-7,bilateral-6) .

**Region of Headache** :

| Headache region | **Unilateral** | **Bilateral** | **Unilateral** | **Bilateral** | **total** |
|---|---|---|---|---|---|
| **Frontal Headache** | 5 | 4 | 5 | 2 | 16 |
| **Temporal headache** | 3 | 3 | 4 | 2 | 12 |
| **Fronto Temporal** | 3 | 1 | 3 | | 7 |
| **All over head** | 2 | 0 | 4 | 4 | 10 |
| **Unilateral facial pain** | 3 | 0 | 2 | | 5 |

16 patients had frontal headache (unilateral-12, bilateral-4).

12 patients had temporal headaches (unilateral-7, bilateral-5).

7 patients had fronto temporal headache (unilateral -7, bilateral-0).

10 patients had pain all over head.

5 patients had unilateral facial pain.

A total of 50 patients **16 subjects (32%)** had headache **at frontal region**

followed by **12 subjects (24%)** had headache **at temporal region**.

**Mucosal contact zones**

| CONTACT ZONE | MALE | | | FEMALE`` | | | TOTAL |
|---|---|---|---|---|---|---|---|
| | Right | Left | Both | Right | Left | Both | |
| MT WITH SEPTUM | 5 | | | 3 | 5 | | 13 |
| MT WITH LAT NASAL WALL | 4 | 4 | 7 | 6 | 3 | 6 | 30 |
| IT WITH SEPTUM | 1 | | | 2 | 1 | | 4 |
| SEPTUM WITH AGGER | | 1 | | | 2 | | 3 |

**The commonest mucosal contact zone** is found to be **between middle turbinate with lateral nasal wall**, followed by middle turbinate with nasal septum-30 .

**Common surgical procedures :**

Lateral lamellectomy -total-15, (unilateral-5, bilateral-10).

Lateral lamellectomy &uncinectomy, MMA- total-5

Lateral lamellectomy&Ant.ethmoidectomy-total-13,uni-6,bilat-7

Sub mucous resection of septum- 11

Sub mucous resection of septum& lateral lamellectomy-4

Agger nasi cell removed- 2

**Follow up** :

All patients were followed up from 2 months to 6 months .

**At 2 months post operatively** :

The headache was relieved in 43 patients & 7 patients had headache.

**After 6 months post- operative** :

only 5 patients had headache and 45 patients relieved of their symptoms.

The **Mean Headache Frequency** was reduced from **14.2 days to 2.4 days** after 2 months of surgery.

The **Mean Headache Severity** was reduced from **5.9 to 1.48** at 2months.

Overall, **86 % of patients -** felt marked improvement in their headache, while 8% had moderate and 6% had mild symptoms of headache at the end of this study.

Very few studies have assessed the surgical treatment of mucosal contact point headaches. Limited studies show good surgical results in patients with contact point headaches.

A total of 50 patients 26 were females , 24 were males. As it was compared with **Mahajan et al 2003** the occurrence of male female ratio of contact headache was equal.

| **Age group** | **Mahajan et al 2003** | **Current study** |
|---|---|---|
| **15-20** | 8 (25%) | 9 (18%) |
| **21-30** | 14 (43.75%) | 25 (50%) |
| **31-40** | 10 (31.25%) | 14 (28%) |
| **41-50** | 0 | 2 (4%) |
| **Male : female** | **15 : 17** | **24 : 26** |

The commonest **age group** of occurrence of contact headache is between **21to30 years -50%** , followed by 31 to 40 years-28%.

when compared with **Mahajan et al 2003** ,the percentage is almost equal. **So our theory is growth of facial skeleton is completed at the age of 20 years. So the mucosal contact point headache due to anatomical variant is common in these age groups**.

The male; female ratio is equal in both studies.

15 : 17- **Mahajan et al 2003** 24 : 26- **Current study 2009**

## Anatomical variants were compared with other studies.

**Deviation of the nasal septum** was found in 26% of cases in the present study . In other studies, 44% in Hemant chopra,12% in Joe et al,3% in mahajan et al,34% in Linnares,brazil.

**Concha bullosa** was found in our study is 44%.in other studis,16% in Hemant chopra,37% in Joe et al,8% in mahajan et al,34% in Linnares,brazil.

**Paradoxical middle turbinate** was found in our study is 10%,in other studies 10% in Hemant chopra,14% in Linnares,brazil.

**Agger nasi cells** are 6% in our study,40% in Hemant chopra,6% in mahajan et al,13.5% in Linnares,brazil.

| **Anatomical Variant** | **Current Study 2009** | | **Hemant Chopra,AS Kurana et al 2006,** | | **Joe et al 2000** | **Mahajan et al 2003** | **LinharesRiello[1]; Brazil,2008** |
|---|---|---|---|---|---|---|---|
| | **Total** | **percentage** | Total | percentage | percentage | percentage | percentage |
| **Deviated nasal septum** | **14** | **26%** | 22 | 44% | 12% | 3% | 34% |
| **Concha bullosa** | **21** | **44%** | 8 | 16% | 37% | 8% | 34% |
| **Over pneumatised ethmoid bulla** | **10** | **20%** | 7 | 14% | 55% | 15% | 11% |
| **Paradoxical middle turbinate** | **5** | **10%** | 5 | 10% | | | 14% |
| **Agger nasi** | **3** | **6%** | 20 | 40% | | 6% | 13.5% |

**The Mean Headache Frequency** was reduced from 14.2 days to 2.4 days after 6 months of surgery.

**The Mean Headache Severity** was reduced from 5.9 to 1.48 at 6 months

**These parameters are compared with F Behin Etal 2004**

| | **Current study** | | **FBehin,R BLipton et al July 2004** | |
|---|---|---|---|---|
| | **Pre op** | **Post op** | **Pre op** | **Post op** |
| **Headache mean frequency (days/month)** | **14.2** | **2.4** | **17.7** | **7.7** |
| **Mean headache severity (pain scale grade)** | **5.9** | **1.48** | **7.8** | **3.6** |
| **Incidence in Female** | **52%** | | **72.5%** | |
| **Reduction in headache intensity** | **86%** | | **91%** | |

**The mean Headache Frequency and Mean Headache severity** are propotionately reduced in both studies.

**In our study, in a series of 50 patients , 86% had significant improvement after 2 month of surgery**.

As per the study conducted by **Tousun F, Gerek M on 2000** showed , In a series of 30 patients, total relief was achieved in 43% of patients, significant improvement in 47% of patients, after endoscopic sinus surgery.

A similar study by **Harley DH, Powitzky ES, clinical outcome for the surgical treatment of sinonasal headache,2003** retrospectively analysed 34 patients who presented with headaches ,were subsequently found to have contact point between the nasal septum and atleast one turbinate. After surgery,reduction in headache intensity was reported by 91% and reduction in frequency by 85% of patients.

Percentage of patients considered cured or with significant improvement after surgical treatment according to studies carried out by many authors.(table 2)

**Table 2.** Percentage of patients considered cured or with significant improvement after surgical treatment according to studies carried out by many authors.

| % | AUTHOR |
|---|---|
| 89 | Morgenstein & Krieger, 1980 |
| 0 | Peacock, 1981 |
| 98 | Novak, 1984 |
| 77 | Schonsted-Madsen et al., 1986 |
| 100 | Goldsmith et al., 1993 |
| 100 | El-Simily, 1995 |
| 99 | Kamal, 1995 |
| 69,2 | Koch-Henriksen et al., 1984 |
| 63,6 | Low & Wilatt, 1992 |
| 78,5 | Novak & Marek, 1994 |
| 80,95 | Wilkmann et al., 2000 |
| 54 | Pereira et al., 2000 |

**86%** **this study (2009)**

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As per **V .J. Novak, MD. -** Most patients {356, 80% ) were asymptomatic postoperative1y, (45, 10%) had a sensation of pressure in the head on rare occasions but no further migraines, and 45 ( 10% ) continued to experience headaches that occurred only rarely and were mild and of short duration. The **overall success rate was 98%.**

1. a. **Surgical corrections of Contact points** in the nose by FESS results in relief of Intractable Headache

   b. The results of **surgical outcome** of treatment of Contact Headache is evident - mostly within 2 months of treatment.

2. **Contact point** - as an etiological factor for headache is more relevant in 20-30 years age group($3^{rd}$ decade) i.e. after completion of development of facio-maxillary skeleton.

3. The most frequent contact point for headache is Middle Turbinate with lateral nasal wall.

4. Refractory headache can be successfully treated in carefully selected patients after precise **pre-operative localisation** of exact points by modern investigations (NASAL ENDOSCOPY) and appropriate **surgical interventions** (FESS).

**Patients diagnosed to have chronic refractory headache / transformed migraine should be assessed for MUCOSAL CONTACT POINT HEADACHE and its appropriate SURGICAL MANAGENENT for CURE.**

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**NORMAL CT SCAN –CORONAL VIEW OF PARA NASAL SINUSES**

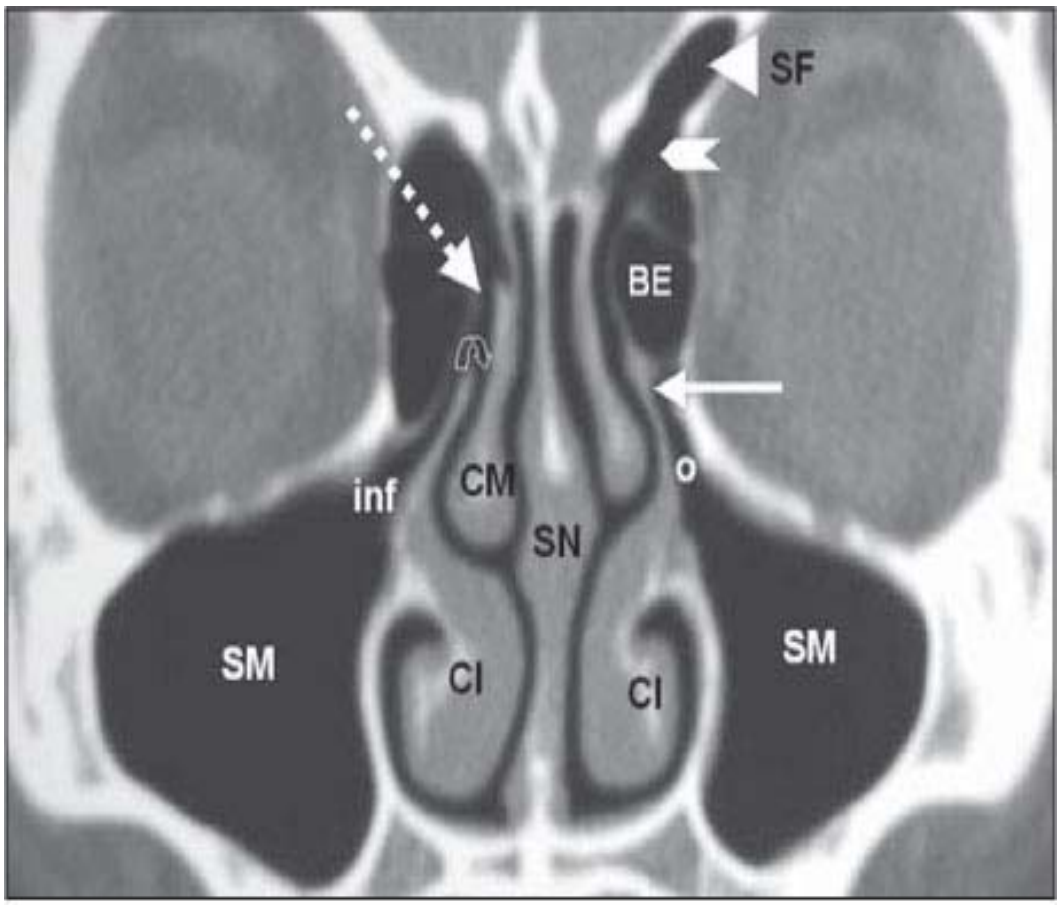
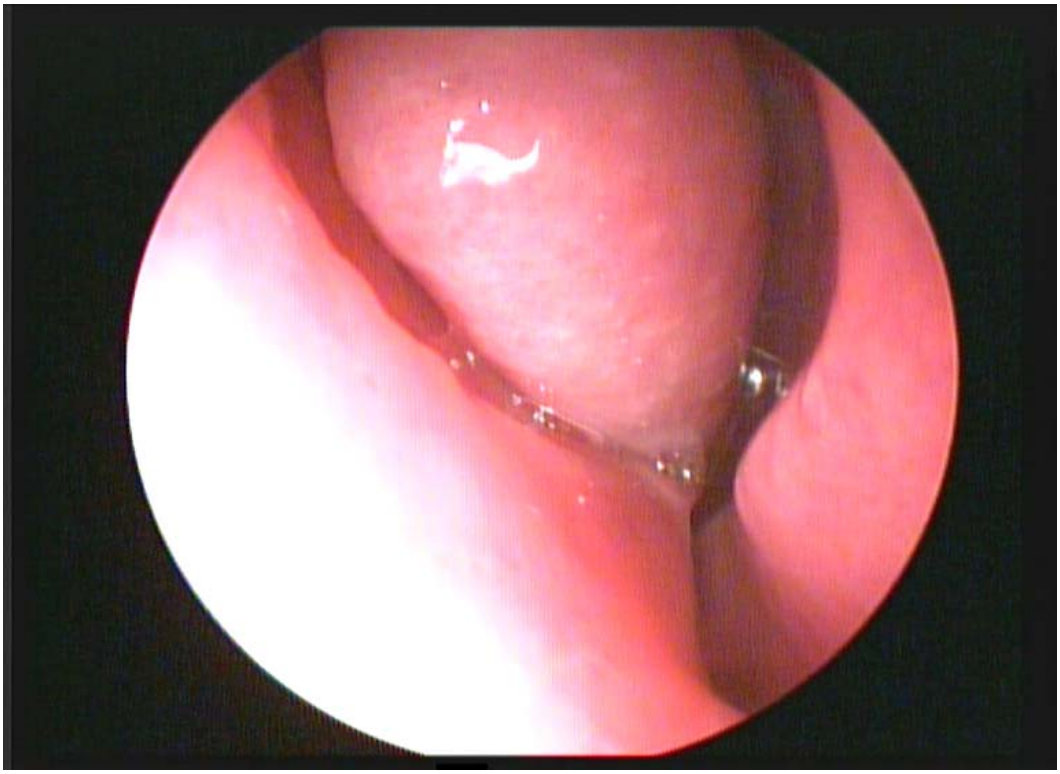
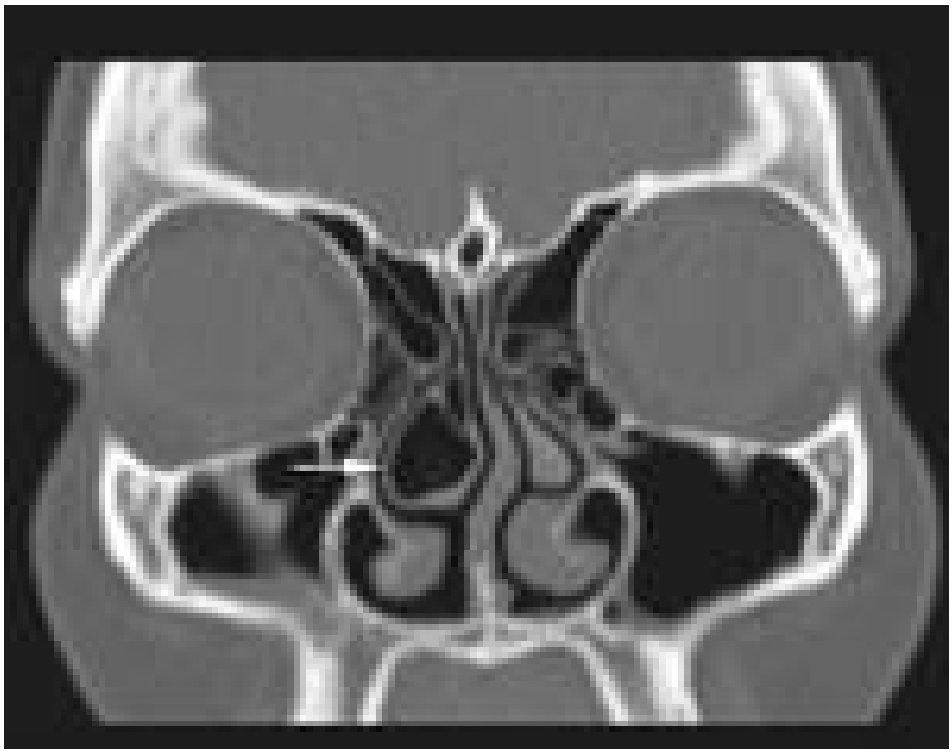


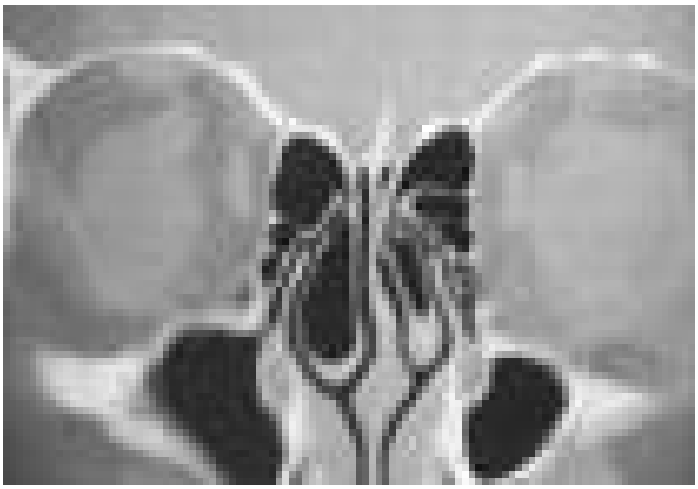

**Figure 1.** Normal anatomy of the anterior ostiomeatal complex. Frontal sinus (SF); Maxillary sinus (SM); maxillary sinus infundibulum (inf); maxillary sinus ostium (o); ethmoid *bulla* (BE); nasal septum (SN); inferior turbinate (CI); middle turbinate (CM); frontal recess (arrow head); uncinate process (arrow); middle meatus (dashed arrow); hiatus semilunaris (white arrow).

**Endoscopic picture of CONCHA BULLOSA**

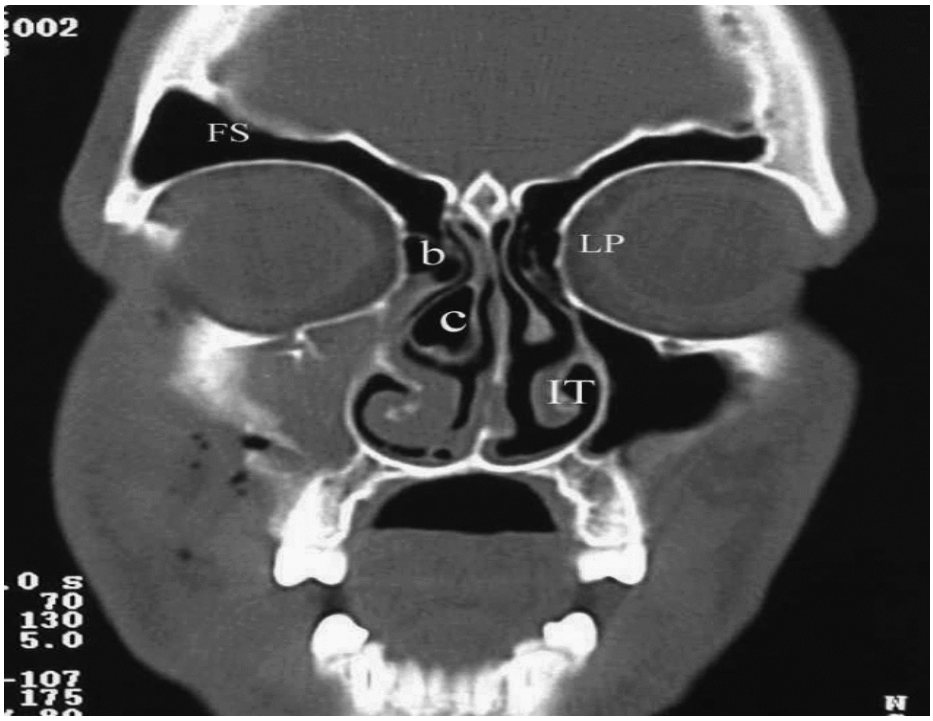


**CT SCAN Picture of CONCHA BULLOSA**

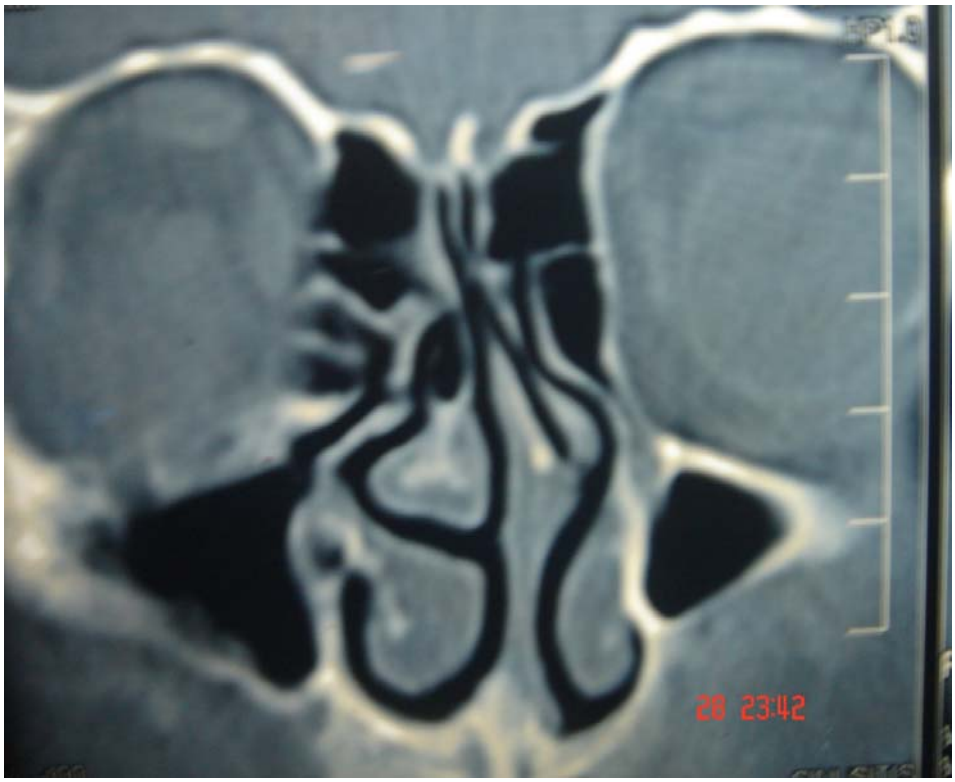




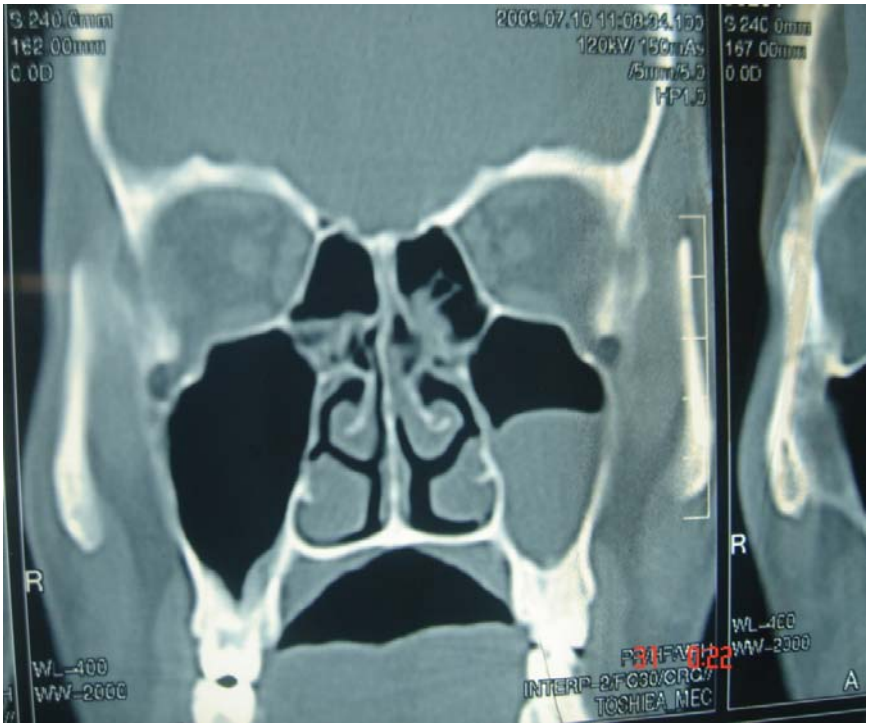
## CONCHA BULLOSA



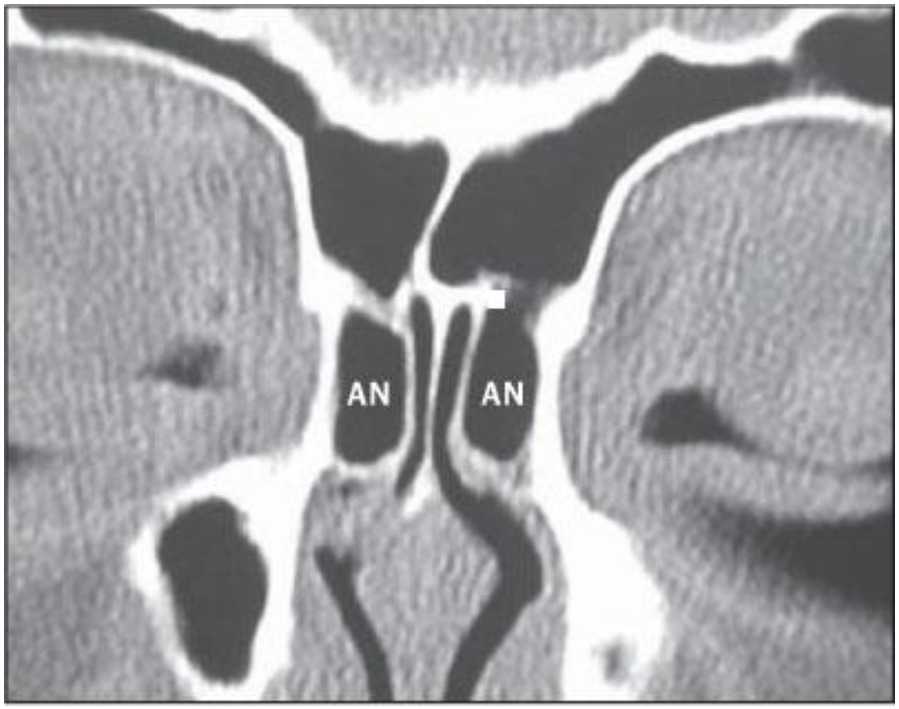

## Deviated septum contact with middle turbinate& Bulla



**Mucosal contact middle turbinate and bulla**

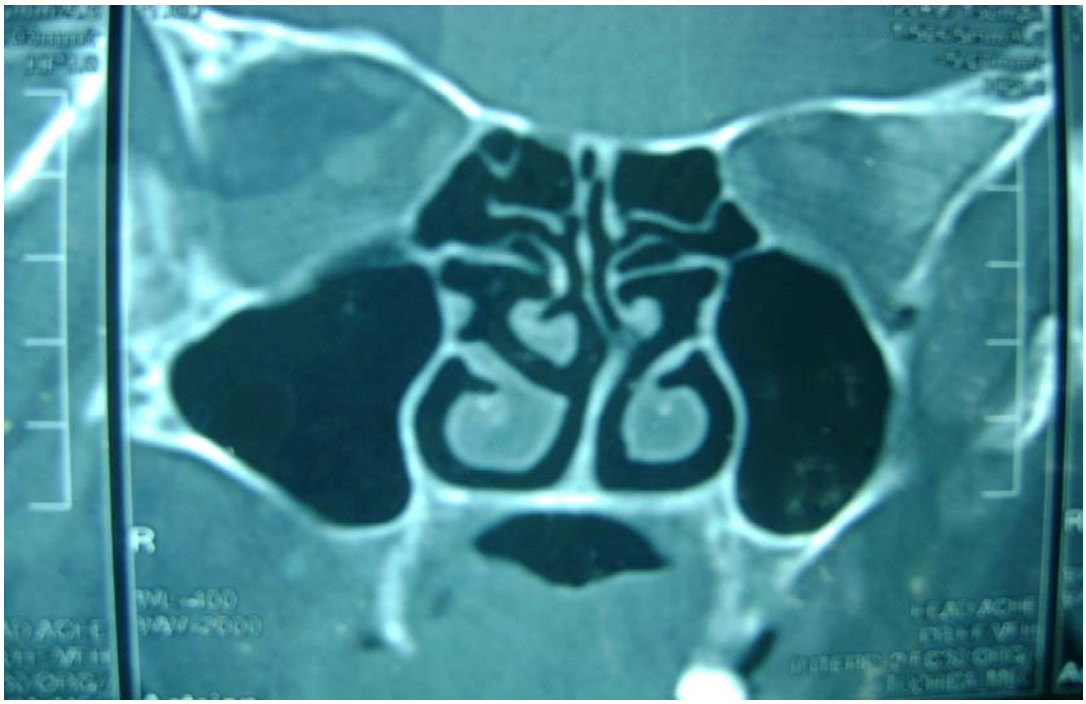



**Agger nasi (AN) cells.**



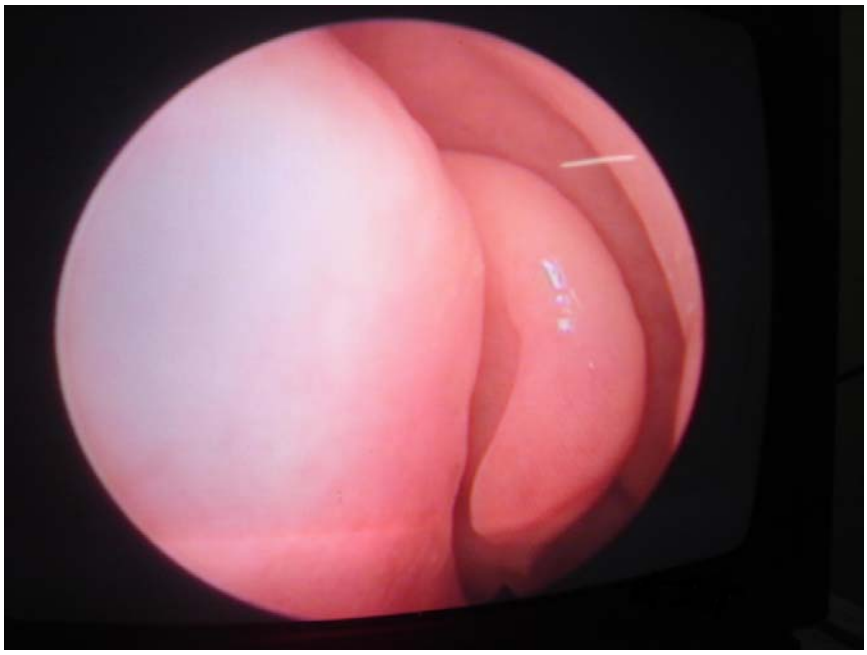
B

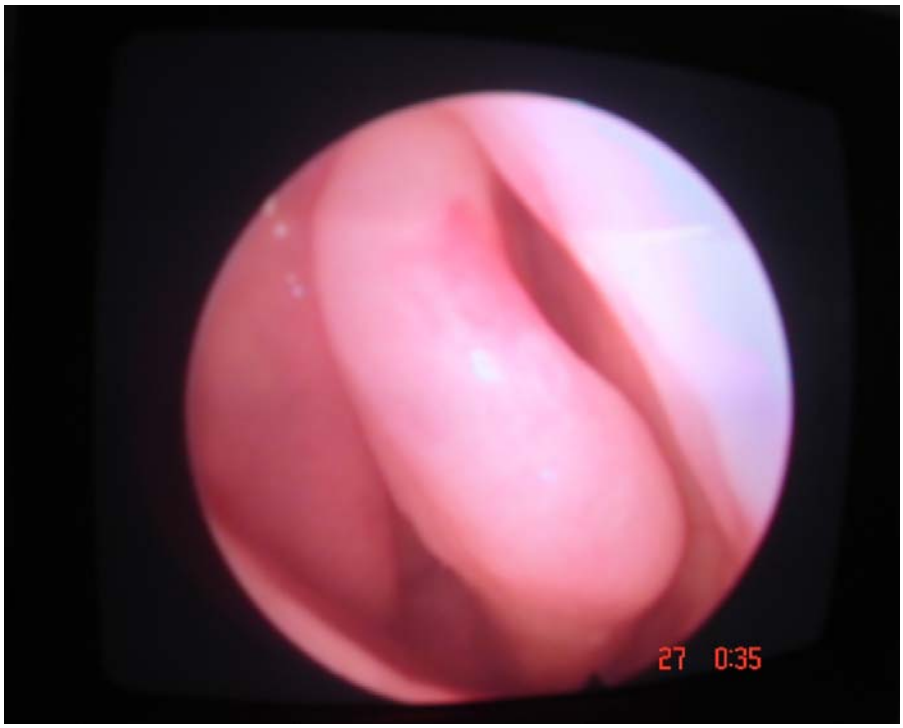
Coronal CT image shows superior, middle and inferior nasal conchas (arrows) and ethmoid *bulla* (arrowhead). **B:** CT coronal section shows uncinate process (large arrow), infundibulum (curved arrow), semilunar hiatus (small arrow) and ethmoid *bulla* (arrowhead).



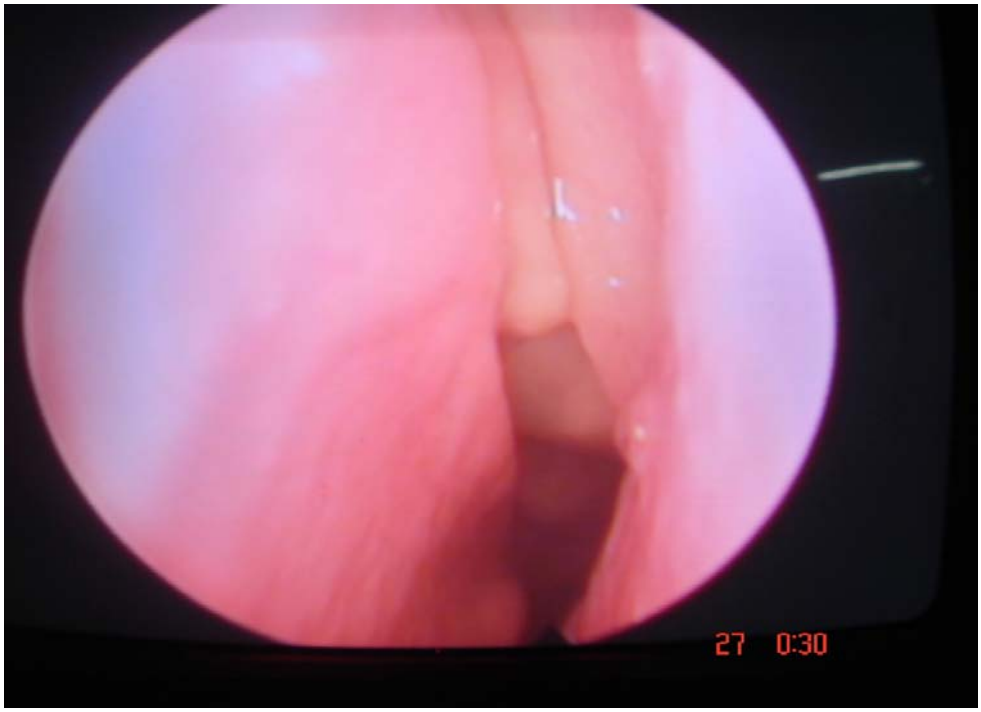
**Contact between septal spur and left middle turbinate**

**Endoscopic picture of  Paradoxically turned Middle Turbinate**



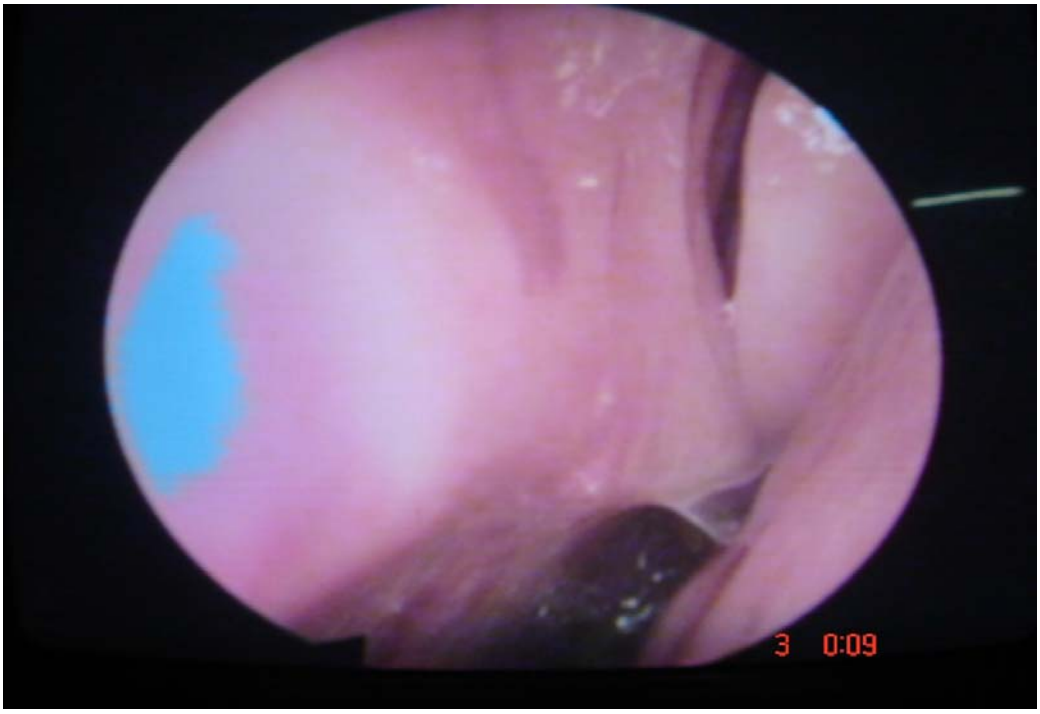


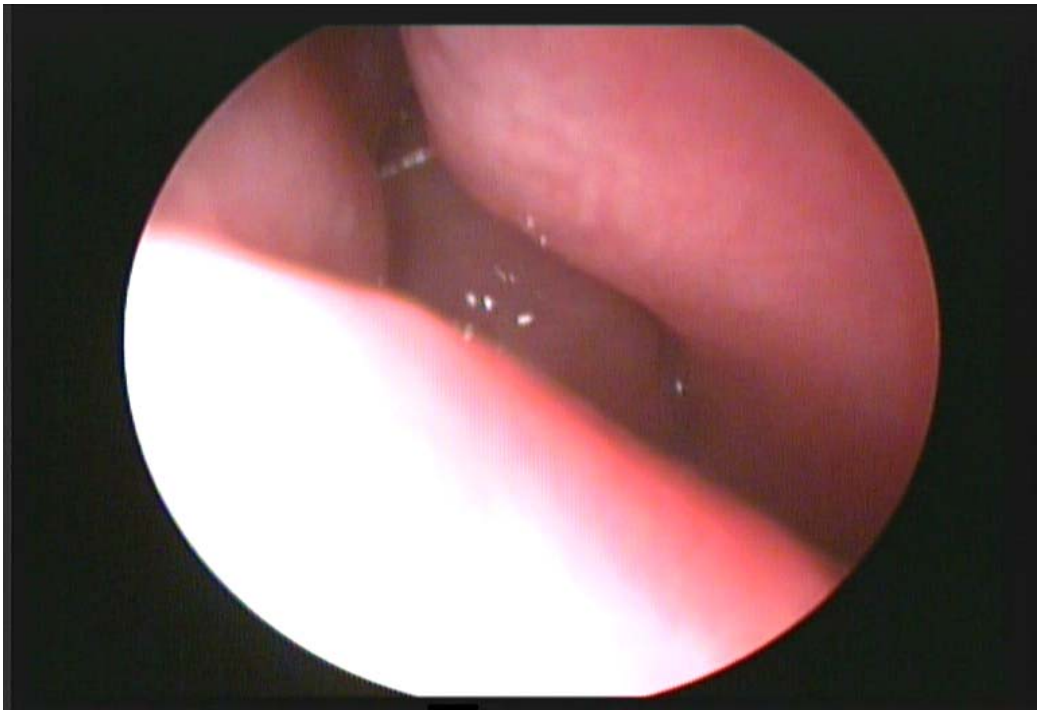
**Crowded Middle Meatus-contact between middle turbinate, septum, bulla, &uncinate**




**Paradoxically turned Middle turbinate-Contact between Middle turbinate &Lateral nasal wall**

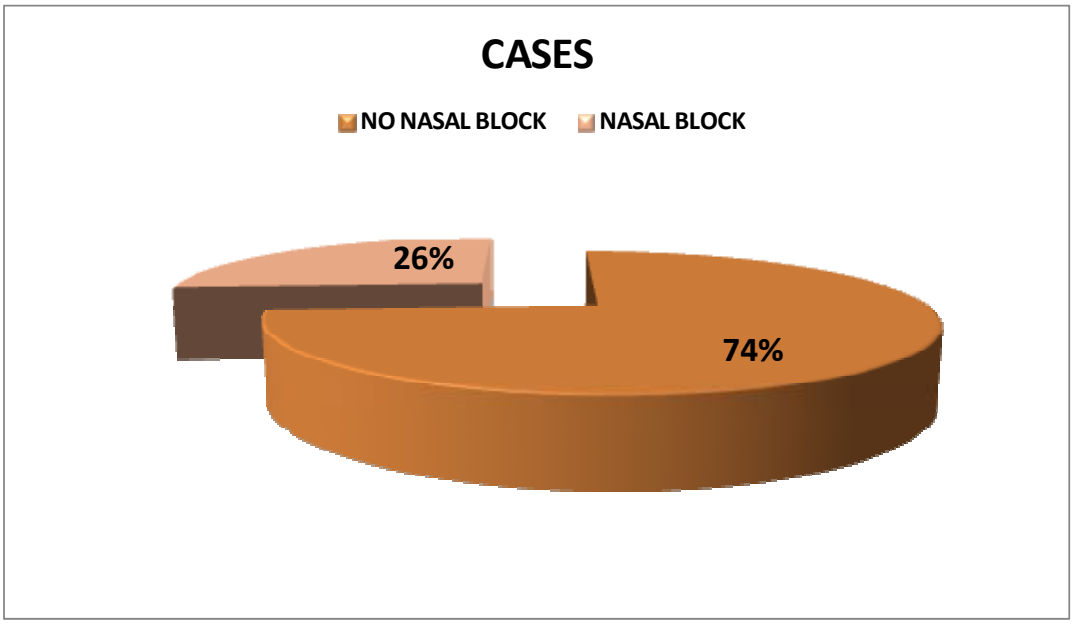
**Endoscopic Picture of Septal spur contact with middle turbinate & lateral nasal wall**

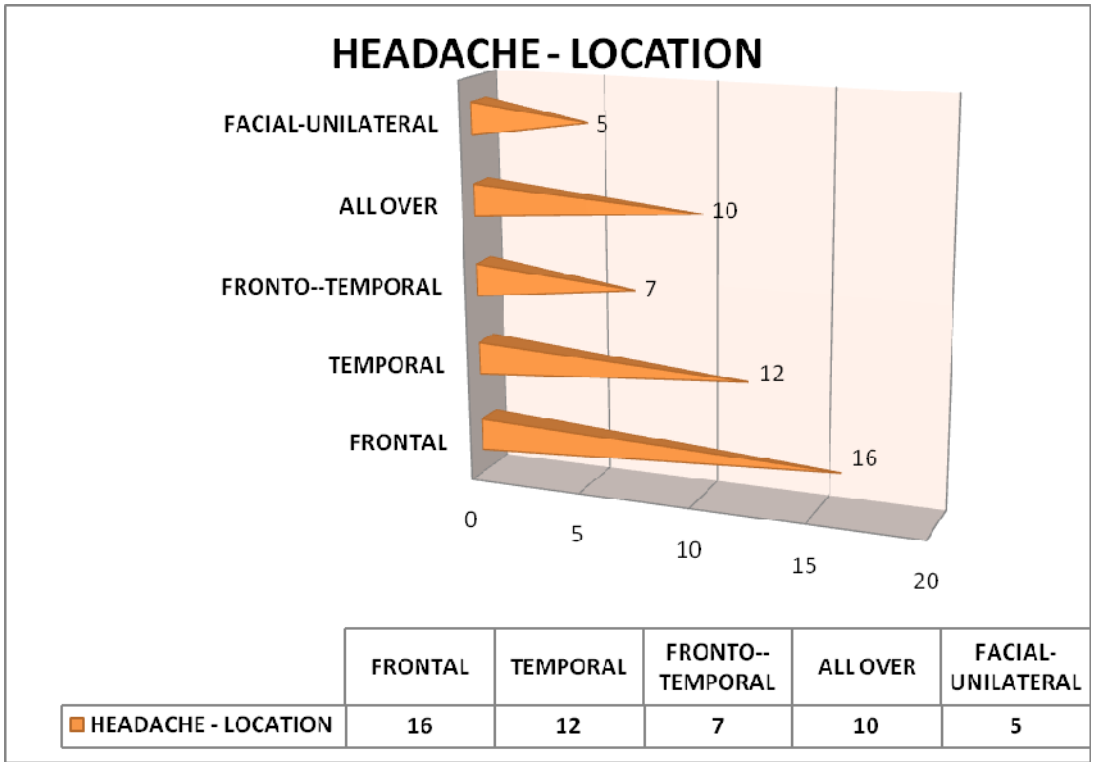


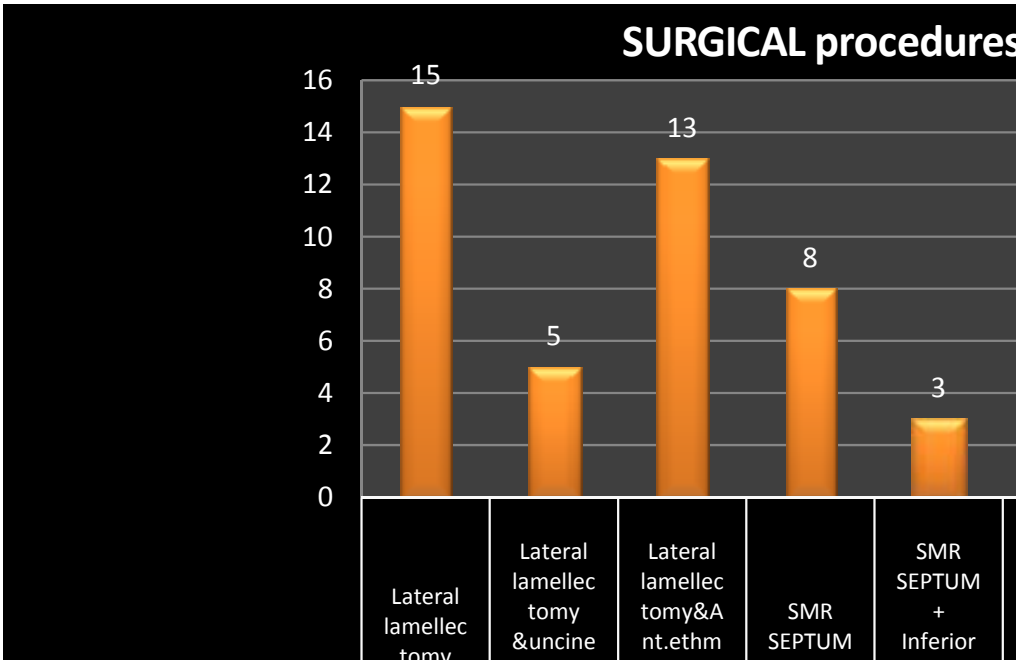
# PAIN SCALE

**To Assess the Rate of HEADACHE SEVERITY**

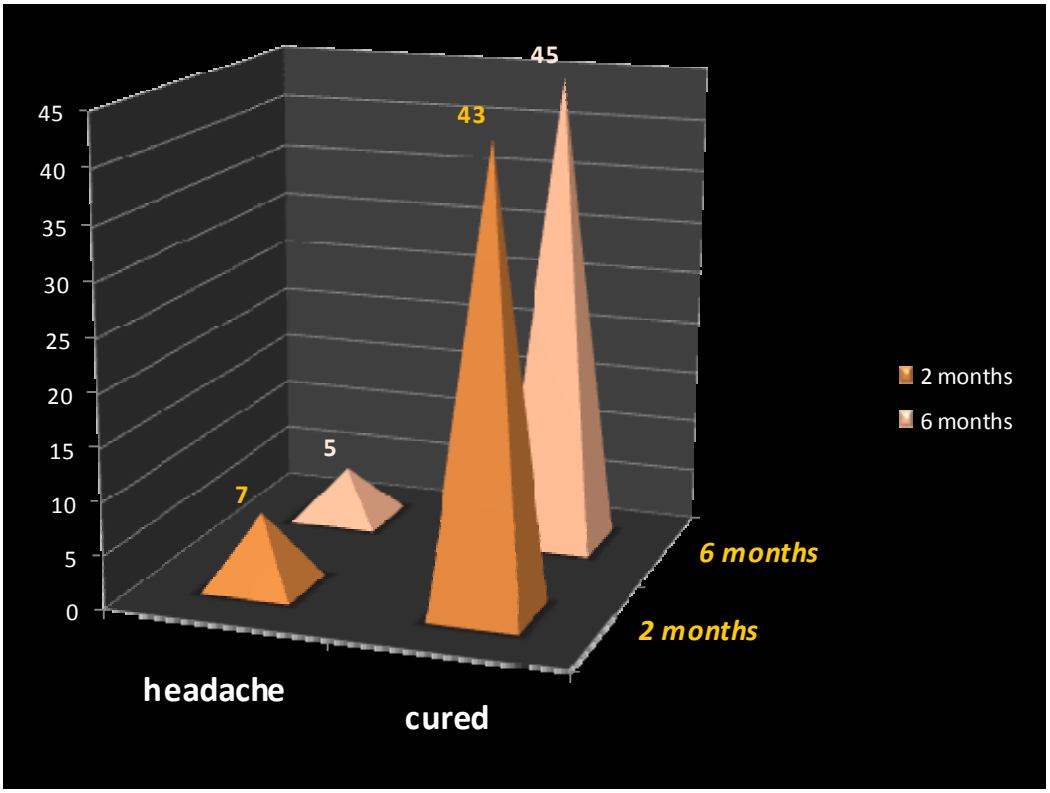


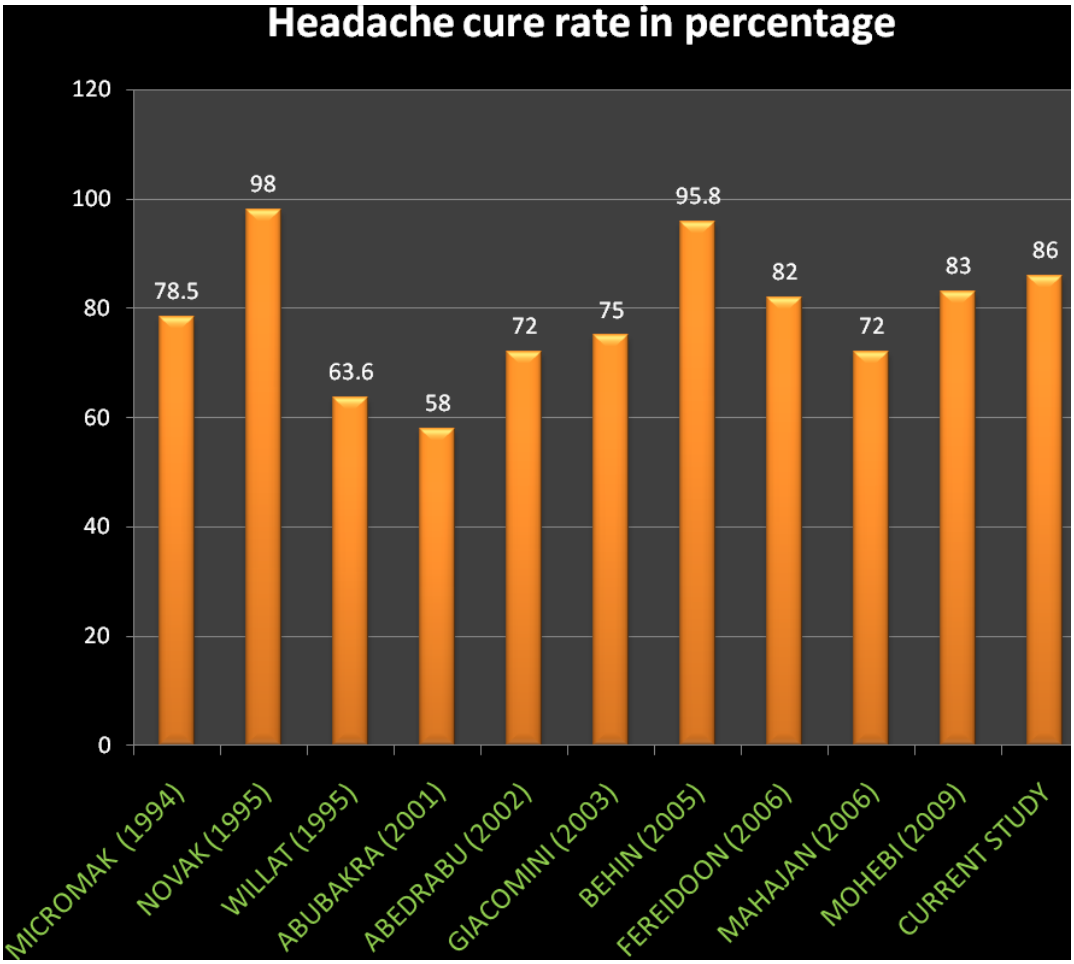




| | FRONTAL | TEMPORAL | FRONTO--TEMPORAL | ALL OVER | FACIAL-UNILATERAL |
|---|---|---|---|---|---|
| HEADACHE - LOCATION | 16 | 12 | 7 | 10 | 5 |


SURGICAL procedures
16
14
12
10
8
6
4
2
0
15
5
13
8
3
Lateral lamellectomy
Lateral lamellectomy &uncine
Lateral lamellectomy&Ant.ethm
SMR SEPTUM
SMR SEPTUM + Inferior

**FOLLOW UP**


45
40
35
30
25
20
15
10
5
0
45
43
5
7
6 months
2 months
2 months
6 months
headache
cured


Headache cure rate in percentage
120
100
80
60
40
20
0
78.5
98
63.6
58
72
75
95.8
82
72
83
86
MICROMAK (1994)
NOVAK (1995)
WILLAT (1995)
ABUBAKRA (2001)
ABEDRABU (2002)
GIACOMINI (2003)
BEHIN (2005)
FEREIDOON (2006)
MAHAJAN (2006)
MOHEBI (2009)
CURRENT STUDY

# PROFORMA

**Name:** _____age ___ sex Date: _____

**c/o headache:**

**Onset:** **Headaches started_____years ago.**

onset: □ under 20 □ 20-30 □ 31-50 □ over 50

**Cause:** History of: □ Injury: _____ □ Infection □ Emotional stress □ Other _____

**Precipitating Factors:** Headaches can be brought on by:

□ Fatigue □ Stress/tension □ Oversleeping □ Certain foods □ Alcohol

□ Talking

□ Menstruation (period) □ Lying down □ Exercise □ Coughing □ Washing

□ Chewing

□ Stooping □ Medication □ Touching face □ Other ____

**Frequency:** Headaches occur _____times each _____day / week / month

Are headaches increasing in frequency? □ Yes □ No

**Severity:** Pain is: □ Mild to moderate □Moderate □ Severe □ Unbearable

Headache prevents normal activities such as work. □ Yes □ No

**Location:** Starts: □ Left side □ Right side □ Either side □ All over head (hatband)
□ Face/Jaw □ Other _____

□ Usually stays in one place □ Sometimes moves around □ Often moves around

If headache moves around, please explain: _____

**Quality of Pain:**

Pain is: □ Throbbing □ Dull □ Sharp □ Tight band □ Stabbing □ Burning

**Duration:**

Lasts ____hours / days if not treated; ____ hours / days if treated immediately

_____ hours / days if treated after they are severe.

Free of headaches from _____ to _____ □ Never free of headaches

**Hormonal: (women only)**

Headache affected by menstrual cycle (how?)_____

Headache affected by pregnancy (how?) _____

**Season:** More frequent: □ Spring □ Summer □ Fall □ Winter □ Not seasonal

**Prodrome:** **Warning before headache**
□ Blind spots □ Upset stomach □ Halos around eyes □ Dizziness □ Light-headed

□ Flashing lights □ Feeling of tightness around head

□ Other _____

**Family History:** **Relatives with headaches**? □ Yes □ No

**Associated Sx**: Symptoms accompanying headache: □ Numbness in leg or arm
□ Nausea & vomiting □ Light sensitivity □ Sound sensitivity □ Ringing in ears

□ Eye tearing □ Visual disturbance □ Dizziness □ Numbness □ Nasal congestion

□ Stiff neck □ Trouble sleeping □ Other _____

**Prior tests/x-rays because of headache:**
_____

**Medications tried for headache treatment**:
_____

Other treatments (ie. Biofeedback) for headaches:
_____

**Current medications**:
_____

**Allergy to medications or food?**

_____

**Medical History**: □ Asthma □ Cancer □ Eye problems □ Hearing problems □ Diabetes

□ Allergies □ Epilepsy □ Sinusitis □ Heart trouble □ High blood pressure □ Depression

□ Kidney Disease □ Liver Disease □ Ulcer

Hospitalization (for other than normal pregnancy):

_____

**Alcohol use:** □ Yes □ No Number of drinks per week: _____

**Tobacco use**: □ Yes □ No # of packs per day _____ How many years _____ Quit Date: __

**Drug abuse:** □ Yes □ No What drugs: _____

**Scales:**

**1.Haedache**

| Grade | 1 | 2 | 3 |
|---|---|---|---|
| Headache | Headache no Medicine | Headache relieved by medicine | Headache not relieved by medicine |

**Nasal obstruction**

| Symptoms | Pre Op | Post Op | | |
|---|---|---|---|---|
| | | 3m | 6m | 1year |
| Nasal Obstruction | | | | |
| Nasal Discharge | | | | |

| Clinical symptoms | Continuous | Intermittent | Unilateral | Bilateral | Remarks |
|---|---|---|---|---|---|
| Nasal obstruction | | | | | |
| Nasal discharge | | | | | |
| Smell | | | | | |

**1.Nasal Obstruction Grade:**

| Grade | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Na. ob. | P/I/U | P/I/B | P/C/B | P/C/B | C/I/C | C/I/B | C/C/U | C/C/B |

History of

Frequent cold sneezing

Loss of smell

## General Examination

PR: BP:

CVS RS

CNS

**Nose** - External Contour

Bridge widening

Dorsum of nose

Anterior nasal examination – Septum

Nasal cavity

Inferior meatus

Inferior turbinate

Middle meatus

Middle turbinate

Spur

Superior turbinate

Superior meatus

**Diagnostic nasal endoscopy -**

Septum

Inferior meatus

Inferior turbinate

Contact point

Choana

Spur

Agar nasi

Middle turbinate

Uncinate process

Contact point

Superior turbinate

**CT SCAN PNS :**

SEPTUM –

CONTACT ZONE –

FRONTAL SINUS –

MAXILLARY SINUS-

ETHMOIDAL SINUS-

SPHENOID SINUS-

**PROBE TEST:**

**PATCH TEST:**

**OPHTHALMOLOGY OPENION:**

**NEURO :**

**DENTAL :**

**PLAN:**

**SURGERY:**

**POST OPERATIVE PERIOD:**